A NOVEL IOT ENABLED HEALTH DIAGNOSIS AND MONITORING MODEL USING MACHINE LEARNING TO CONTRUCT A SAFE , SECURE VIRTUAL HEALTH ENVIRONMENT FOR MINORS AND FEMALE STUDENTS

A Synopsis

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Introduction

The use of IoT in healthcare systems has been significantly improved in a variety of cases of IoT use. Because human lives rely on health care, this is definitely a crucial field. It is quite difficult for researchers to digitise the process. They are constantly creating new and innovative solutions for digital medical services. IoT plays a crucial role in this sector. As per Cisco, around 50 billion gadgets will be associated with web constantly 2020. We can follow IoT's accomplishment in the utilization of clinical gadget incorporation, telemonitoring, keen sensors, glucose screens, prescription containers, movement trackers and wearable biometric sensors. Uncommon applications like shrewd pills, savvy beds, individual medical care, keen home consideration and Real-Time Health Systems (RTHS) are most recent increments to computerized medical services. Far off patient observing is another approach to acquaint brilliant medical care with mass individuals

In immature and non-industrial nations, ladies and kids medical services is a significant plan of government in light of high maternal and youngsters death rate. 44% decrease in worldwide maternal mortality proportion is seen somewhere in the range of 1990 and 2015 as per Sustainable Development Goal (SDG) Report in 2016. World Health Organization (WHO) exceptionally puts an accentuation on the nature of antenatal consideration . eHealth and versatile wellbeing (mHealth) framework engineers are planning explicit medical care applications for ladies and youngsters to make mindfulness with respect to unhealthiness, heftiness and mortality issues. Youngsters medical services faces a ton of difficulties as a result of different variables like protection inclusion, restricted assets and deficient therapeutic assets . So as to clean the current medical services offices accessible to ladies and kids, their dynamic support rate is compulsory. Qualities of a solid way of life comprises of a few exercises, legitimate information on sustenance, suitable eating regimen plan and attention to hazardous maladies. Usage of such medical services applications aids dynamic inclusion of clients. Also, the mHealth and eHealth arrangement designers come to find out about client associations, shortcomings present in conventional frameworks and helpful input.

Client experience must be contemplated while making an imaginative methodology. The dynamic functionalities of IoT is making it conceivable to guarantee client experience and it has been conceivable after a great deal of examination on security, conventions, inserted gadgets, applications, interoperability and organization designs. To send the innovation, a ton of nations are applying significant approaches and rules . Ladies and youngsters medical care is considered as a delicate case in view of its defenseless and disastrous insights. It is important to actualize the most proper and effective frameworks to maintain their wellbeing status. Yet, the weight of increasing expenses in medical services frameworks can decelerate the entire cycle. It involves delight that different programming and associated gadgets are accessible to relieve some money related issues that the medical care suppliers are looking as of now. This is being conceivable by the ongoing progressions of IoT.

In this paper, we made an exertion to feature the computerized medical services arrangements dependent on IoT accessible for ladies and kids and how they are reshaping the current situation of ordinary medical services the executives frameworks. Generally, a broad arrangement of models

accessible for ladies and kids are exhibited all through our paper. We likewise portrayed the difficulties and progressing patterns of present computerized medical services frameworks for the objective clients.

The wearables and applications might be the recommended for postmenopausal ladies to forestall sarcopenia. Another open door for midlife ladies might be the turn of events of explicit applications to compute every day recompenses of protein what's more, different supplements applicable to the soundness of muscles and the body generally speaking, and to forestall against sarcopenia. Concerning menopausal protests, a suit of sensor based smart attire utilized for locally established and mobile wellbeing checking has been proposed. The smart attire checking framework could successfully gauge the skin temperature and more, relative mugginess in various body zones for people. Information on the frequency, duration, and intensity of a hot flush could be recovered and physiological evaluation of vasomotor side effects achieved. An ongoing concentrate on the utilization of sensor-based brilliant attire for menopausal ladies indicated the most frequently reported complaints were hot flushes (65%), tiredness (62.5%), sleep disturbances (60%) and night sweating (52%). Rest aggravation, a typical issue among postmenopausal ladies, has additionally been contemplated. Rest amount was estimated utilizing a FitbitVR tracker and a rest journal, while rest quality was estimated utilizing the different quality index available.

The framework will give early location of lack of healthy sustenance and physical and intellectual disintegration. The framework uses four innovations, for example, 'Intelligent platform', a Wii-based equalization board for every day weight evaluation; an Android tablet containing the three applications; a wrist-worn wristband that gathers tolerant measurements and sends them to a brought together locally situated station; and ecological home-introduced sensors to survey way of life propensities and level of socialization.

The customary model of emergency clinic driven consideration is more responsive and tends not to include patients as a functioning aspect of the clinical cycle. Be that as it may, the current framework has insufficiencies. To begin with, doctors need constant data on a patient's day by day schedule, for example, physical action, diet, rest, and public activity, which are all significant in analysis and therapy. Second, the absence of patient adherence to therapy and clinical exhortation expands the danger of chronic frailty results, hospitalization and an expanded financial weight on both the individual and the wellbeing framework. Third, enormous urban areas will request more medical care framework to serve the rising populace. Last, as the interest for medical care administrations increments, so too does the interest for medical services workers.

Understanding focused consideration is the answer for the expanded interest for clinical administrations around the world. So as to genuinely coordinate emergency clinics or facilities with patients in persistent focused consideration, there is a need to use the incredible biological system of IoT. Including keen wearable sensors into the standard consideration so that we can have real time data of the patients. Sharing real time data of patients could improve doctor understanding relationships,and increment the association of patients in their own medical care. In any case, wearables should just supplement the customary techniques for scoring mental, physical and enthusiastic wellbeing boundaries.

Objectives of the study

- To identify problem related medical Interaction between the Female section and the doctors in Rural areas.
- To Design a Framework to safely bring Female Patient and the Doctor to a common platform.
- To Design a Framework and an Integrated Medical Platform using the Internet of Things.
- To study the implementation of Low Power Wide Area Network (LPWAN) in the transmission of data generated from medical devices.
- To design an Framework for analysing the data received from Medical Devices and representing it to Patient Doctor framework.

Review of literature

R. Prasad and H. Kobayashi [2], so as to improve equipment portrayal language plan efficiency, propose the nine-venture multi-philosophy configuration measure model comprising of framework determination, framework dividing, displaying or variation, segment reproduction, framework authoritative, framework reproduction, pre-combination adjustment, rationale blend and rationale reenactment [2]. The solution empowers the reduction of the time needed for demonstrating and reproduction related exercises by 31% and 16%, separately, contrasted with the traditional equipment depiction language-based plan.

The plan technique proposed by S. A. Mengel et al. contains the three phases: necessities, determination and execution [3]. At the necessities stage, the fashioners should zero in on the key idea of the issue and propose a chart with the structure of the framework. At the particular stage, they refine the proposed chart into the substance flowchart, which ought to be effectively implementable into the considered framework in the last plan stage. Also, after every DM stage, the approval and confirmation ought to be completed to guarantee that the key ideas would have been met.

To improve the efficiency of the mind boggling hardware framework plan, H. Eskelinen proposes to apply two polls to the customary four-stage hardware framework plan, which are: framework plan, gadgets plan, mechanical plan and plan for assembling [4]. Those polls are utilized to frame prerequisites arrangements of electronic framework segments.

F. Wang and M. J. Hannafin express that the plan based examination ought to be "logical, grounded, intelligent, iterative, adaptable, integrative, and relevant" [5]. In view of this presumption they structure nine standards of the plan based exploration: uphold plan with research from the beginning; set viable objectives for hypothesis advancement and build up an underlying arrangement; direct the examination in delegate true settings; team up intimately with members; actualize research techniques methodicallly and intentionally; break down information promptly, persistently and reflectively; refine plans constantly; archive logical impacts with plan standards; and approve the generalizability of the plan.

A. Saini and P. Yammiyavar picked the client as the point of convergence of the plan of m-wellbeing framework [6]. They utilize the article situated framework plan procedure, run of the mill for programming advancement, and afterward study connections and connections between the framework prerequisites and the segments of the client's needs and objectives. Client driven plan turns out to be particularly helpful in wellbeing applications, where the partners and various types of clients may communicate various prerequisites and limitations.

The proposed DM approach of M. Ahmad thinks about five plan angles: the objective field disappointment rate, expected use climate, expected climate use conditions, expected fenced in area use conditions and expected item inside conditions [7]. The strategy is appropriate to assess the objective's lifetime in the Internet of Things (IoT). It utilizes the probabilistic methodology for assessing equipment unwavering quality with given dubious use conditions while thinking about generally framework dependability.

It is best that the gadgets utilized for observing purposes work remotely [8], shaping Wireless Sensor Networks (WSNs), which comprise the significant piece of IoT [9]. WSNs are broadly utilized in medical care applications because of their favorable circumstances and variety. In [10], C. Rotariu and V. Manta propose WSN for observing patients' pulse and oxygen immersion. W. Y. Chung, S. C. Lee and S. H. Toh install Electrocardiography (ECG) and circulatory strain sensors into a mobile phone [11].The remote body region network is a case of a reasonable way to deal with the IoT medical services worldview.

S. - L. Tan, J. Garcia-Guzman and F. Manor Lopez use Wi-Fi innovation to communicate information about the circulatory strain, pulse, internal heat level and oxygen immersion to the base station [16]. J.Wannenburg and R. Malekianc apply Bluetooth innovation and a cell phone for checking the patient's wellbeing boundaries [17]. In IoT medical services applications, one of the most as often as possible observed issues is the limitation of patient or gear. For this reason, contingent upon the application, different techniques and advancements are utilized. Various methodologies depend on Received Signal Strength (RSS) [17].

M. Shchekotov utilizes RSS estimations from a few realized Wi-Fi passages guaranteeing the confinement exactness at a four room-zone level on a solitary floor of a structure. So as to confine an advantage in the medical services climate, the creators of [13] utilize the current foundation of the Wireless Local Area Network (WLAN), expanded just with six passageway reference points. In light of Wi-Fi RSS estimations and small Wi-Fi labels, they can limit the benefits like wheelchairs, beds, and so on, with an exactness of around 2 m in the emergency clinic center climate of 63 m 46 m size. W. H. Chen et al. use RFID RSS estimations of the reference and observed labels to assess the cost work comprising of the dissimilarity and similitude of RSS among observed and reference labels [12]. Thusly, the three ideal reference labels are found, and the situation of the observed tag is resolved as the focal point of mass of the triangle, which they structure. The normal limitation mistake of a patient or resource in a 5 m x 10 m medical services climate is about 0.74 m. F. Palumbo et al. propose the stigmergy approach joined with RSS estimations of Bluetooth Low Energy (BLE) [18]. Their methodology brings about a confinement blunder of under 1.8 m in 75% cases in a 6 m 6 m outfitted office. J. Wyffels et al. propose a medical care committed indoor limitation calculation dependent on BLE RSS estimations and least squares-uphold vector machine, coming about at the four room-zone level restriction exactness [12]. The creators of [13] center around patients' limitation, following and checking in the nursing organization climate. They use RSS estimations of the ZigBee standard and a molecule channel. Subsequently, they accomplished a normal restriction blunder of under 2 m in 80% of cases.

Research Methodology

This research consists of many modules which have different research methodology asper their categories and requirements.

1. A framework for secured interaction between the female patient and doctor: The basic idea came with the problems faced by the Female section in the Rural areas to intreract with the Doctors. Since they are less literate so that face problem while visiting to the Village doctors (non-Government), many cases have come up with the female section that they are being harassed after the treatment. We are in a process to analyse all the problems and solve them using the latest technology without affecting any of the government policies.
2. A Framework to design a model with different sensors and analytical tools to get the correct data at very affordable cost. The medical devices are very costly and are also not available at all the 'Ayushman' Clinics established by the Government. We are in process of designing very small and low cost multi data device which can be carried to any rural place and collect minimum required data required for any medical process.
3. A framework to send data from distant places using low cost network even from places which are not reach of GSM network. We are working on LPWAN (Low Power Wide Area Natwork), specially LoRa network which can transmit sensor data to long distances up to 20-25Km without need of GSM network. We have already sent the GPS and Thermal Data using this network.
4. A Framework to analyse the medical data and use predictive models to poredict the effect of different conditions on human being health.

Data collection:-

1. **Primary Data**-

We have 3 different modules working in this development of framework, these modules are:

a) **FPDCP (FEMALE PATIENT TO DOCTOR COMMUNICATION PLATFORM)** . This platform will be developed to bring Female Patient to the doctor safetly. The primary Data collection will be :

The primary data will be collected by talking with the female section in the rural area, Schools and Colleges of Rural area.

b) **Integrated medical and IOT platform**: The Primary data will be collected from sensors which are specially designed for medical reading from patients.

c) **Framework for LPWAN in IOMT** : The primary data is already collected but we will be collecting more data using in the specified rural areas.

d) **Framework for analyzing Medical data from sensors and future predictions**: The primary data will be collected from specific patients (through their consent) and later used for their benefits.

2. **Secondary Data**

a) Since the framework has direct relation with the living person so we will get the data sets from the reputed and authorized medical databases.

b) We will also use data sets for sensors from the authorized medical vendors.

c) We will collect data from the International Universities where research on medical sensors is in progress.

d) We have already downloaded data from some recognized vendors such as 'PHILIPS' and authorized data centres such as www.kaggle.com.

Sampling:-

Sampling Unit: 4 sensor data is being collected.

No of Sensors- I have taken 4 sensor data and will take 10 more sensor data.

1. Temperature (Human Body)
2. Blood Pressure.
3. Oxygen sensor and pulse sensor.
4. ECG sensor.

Size of Sample: more than 1000

Source List: We collected from sensor and also from medical data providers.

Analytical Tools:-

We will be using Python for creating analytical platform using data science algorithms. The intelligence tools used will be different libraries of python.

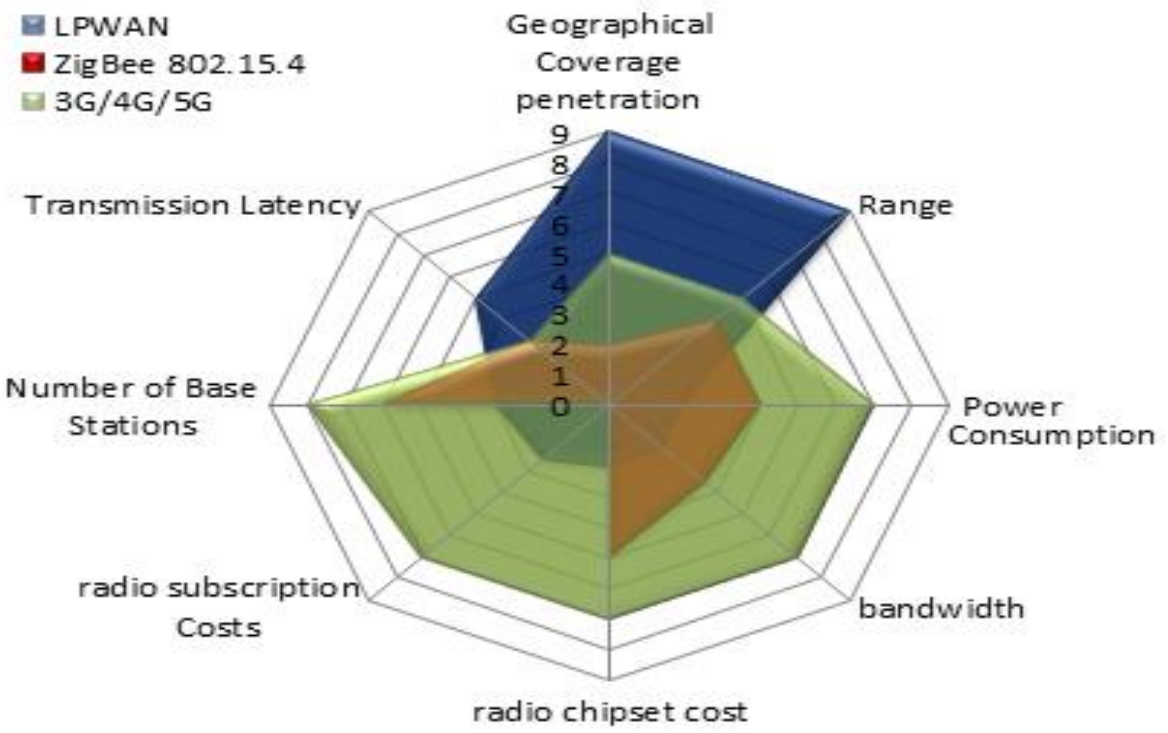
The data will be represented by using BI tool : Tableau.

The data will be stored on the AWS cloud using the things network.

The LPWAN will be using the Dragino based LoRa Gateway kit and transmission methods.

PREVIOUS RESEARCH WORK

1. COMPARISON BETWEEN DIFFERENT NETWORKS



Requirements	Licensed Spectrum			Unlicensed Spectrum	
	LTE-M	NM-IoT	SigFox	LoRa	Others
Coverage	160 dB	164 dB	149 dB	157 dB	177 dB
Bandwidth	1MHz	180Khz	100Hz	125KHz	1MHz
Throughput	1 Mbps	250 Kbps	100 bps	290 bps-50 Kbps	624 Kbps
2 Way Data TX	Yes	Yes	No	Depends	Yes
Security	128 - 256 bits	128 - 256 bits	16 bit	32 bit	AES 128 bit
Scalability	High	High	Low	Medium	High
Mobility Support	Connected & idle Mode	Idle Mode	No	Yes	Yes
LBS Support	Requires GPS	Requires GPS	No	Yes	Requires GPS
Battery	10+ Years	10+ years	10+ years	10+ Years	10+ years
Availability In India	Yes	Yes	No	Yes	No
Cost factors	Costly	average	N/A	Low	N/A

2. MEDICAL DATA:

1.00E+00	9.00E-01	3.59E-01	5.15E-02	4.66E-02	1.27E-01	1.33E-01
1.00E+00	7.95E-01	3.75E-01	1.17E-01	0.00E+00	1.72E-01	2.84E-01
9.09E-01	7.91E-01	4.23E-01	1.87E-01	0.00E+00	7.84E-03	6.30E-02
1.00E+00	4.79E-01	5.68E-02	6.42E-02	8.13E-02	7.27E-02	5.56E-02
1.00E+00	8.67E-01	2.01E-01	9.93E-02	1.41E-01	1.21E-01	1.09E-01
9.49E-01	5.05E-01	4.18E-03	2.25E-02	5.95E-02	1.07E-01	1.10E-01
1.00E+00	4.88E-01	1.14E-01	0.00E+00	3.01E-02	6.50E-02	6.09E-02
1.00E+00	4.60E-01	1.22E-01	9.30E-03	1.26E-01	2.20E-01	2.67E-01
1.00E+00	7.55E-01	1.35E-01	0.00E+00	2.86E-01	3.31E-01	2.57E-01
1.00E+00	7.06E-01	3.23E-01	1.02E-01	1.37E-02	2.23E-01	2.86E-01
9.69E-01	6.56E-01	1.73E-01	0.00E+00	6.05E-02	1.91E-01	2.49E-01
1.00E+00	1.93E-01	2.32E-02	4.72E-02	2.74E-02	9.45E-02	1.15E-01
1.00E+00	9.16E-01	1.92E-01	1.49E-01	1.68E-01	2.31E-01	2.42E-01
9.26E-01	7.91E-01	4.59E-01	2.42E-01	1.43E-01	1.80E-01	1.91E-01
1.00E+00	6.45E-01	3.09E-01	7.63E-02	3.33E-02	2.36E-01	2.83E-01
9.69E-01	5.08E-01	1.32E-01	6.62E-02	6.75E-04	4.46E-02	5.54E-02
9.23E-01	6.71E-01	2.31E-01	5.01E-03	7.57E-02	6.90E-02	5.62E-02
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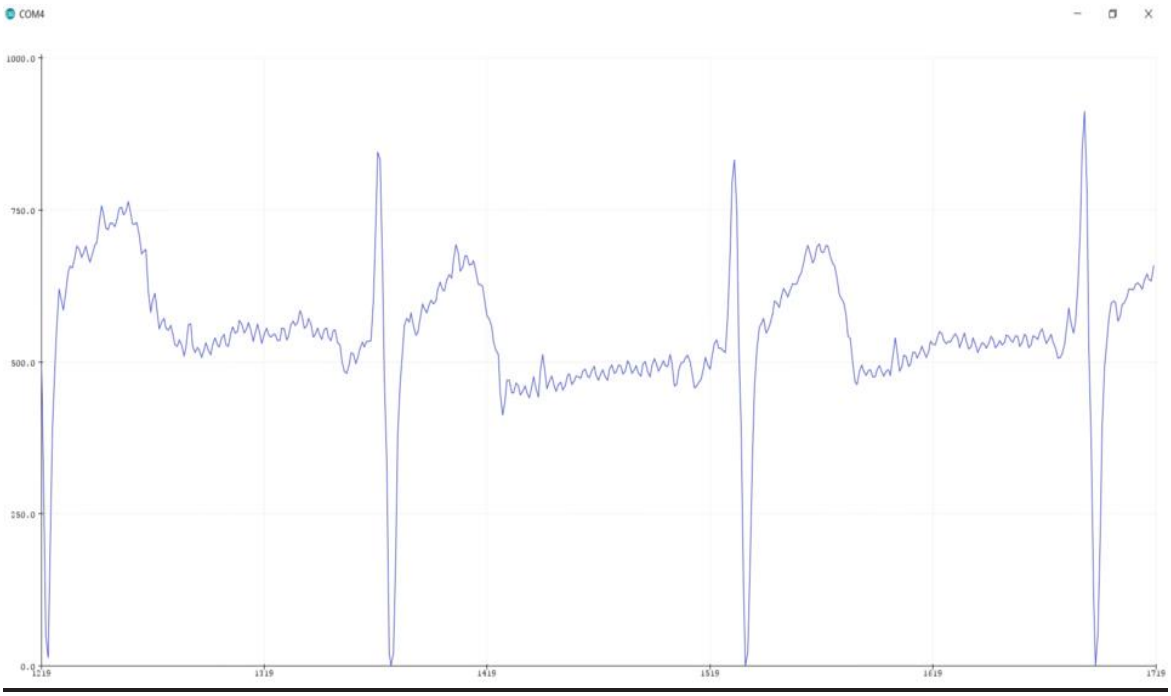

Hypothesis:-

H1- Cognitive Machine Learning Will Lead to More Comfort

H2- Openness and Security

The data of medical information from the different sources (sensors) are being collected from age group of 15 to 18 years and then we matched it with the data from the standard machines.

***WE ARE IN THE PROCESS OF FINDING A BETTER MEDICAL FACILITY FOR THE FEMALE SECTION WHICH IS BETWEEN AGE OF 15 TO 30 IN THE RURAL AREAS*.**

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